

Correlation of Radiographic Outcomes and Quality of Life for Multilevel Cervical Spondylotic Myelopathy

Heath P Gould BS; Kelsey C Goon; Emily Hu BA; Joseph E Tanenbaum BA; Colin Haines; Don K Moore; Thomas E. Mroz

MD
Cleveland Clinic

Introduction

Posterior operative approaches have demonstrated clinical benefit for multilevel cervical spondylotic myelopathy (CSM). Prior investigations have independently reported the radiographic and quality of life (QOL) outcomes associated with posterior cervical surgery, but the relationship between radiographic metrics and QOL remains unclear.

Methods

A retrospective cohort study was conducted among patients undergoing laminoplasty or laminectomy with fusion for the treatment of multilevel CSM. QOL and radiographic data were collected preoperatively and postoperatively between 2008 and 2015. The EQ-5D instrument served as a measure of overall QOL, while the PDQ measured disability and the PHQ-9 assessed mental health. Radiographic metrics included C2-C7 Cobb angle, C2-C7 sagittal vertical axis (SVA), and modified Ishihara index. Multivariable linear regression models were used to investigate the association between radiographic measurements and QOL, while controlling for the following variables: age, gender, marital status, type of surgical procedure, Body Mass Index, Charlson Comorbidity Index.

Results

125 patients were eligible for inclusion. Following multivariable linear regression, change in radiographic measurements – preoperative to postoperative – did not correlate with change in QOL (Table 1). Similarly, change in radiographic measurements was not associated with achieving a minimum clinically important difference (MCID) in any of the QOL instruments (Table 2). When preoperative radiographic measurements were compared to change in QOL, SVA was found to be a

Table 1

Table 1. Δ radiographic metrics vs. Δ QOL

	Δ Cobb	Δ SVA	Δ Ishihara
Δ EQ-5D	0.31	0.33	0.27
Δ PDQ	0.89	0.17	0.97
Δ PHQ-9	0.20	0.57	0.49

Entries are reported as *p*-values

Table 2

Table 2. Δ radiographic metrics vs. QOL MCID

	Δ Cobb	Δ SVA	Δ Ishihara
EQ-5D MCID	0.30	0.33	0.25
PDQ MCID	0.96	0.13	0.85
PHQ-9 MCID	0.18	0.13	0.47

Entries are reported as *p*-values

Table 3

Table 3. Pre-op radiographic metrics vs. Δ QOL

	Pre-op Cobb	Pre-op SVA	Pre-op Ishihara
Δ EQ-5D	0.88	0.03	0.09
Δ PDQ	0.81	0.71	0.52
Δ PHQ-9	0.11	0.73	0.95

Entries are reported as *p*-values

Conclusions

Cobb angle and Ishihara index were not associated with QOL. One statistical model revealed an association between preoperative SVA and improvement in EQ-5D; however, the small β coefficient indicates that this correlation is unlikely to be clinically significant. We therefore conclude that radiographic outcomes are a poor surrogate for QOL in patients undergoing posterior surgery for multilevel CSM.

References

- Heller JG, Edwards CC 2nd, Murakami H, Rodts GE: Laminoplasty versus laminectomy and fusion for multilevel cervical myelopathy: an independent matched cohort analysis. *Spine* 2001, 26:1330–1336.
- Woods BI, Hohl J, Lee J, Donaldson W 3rd, Kang J: Laminoplasty versus laminectomy and fusion for multilevel cervical spondylotic myelopathy. *Clin Orthop Relat Res* 2011, 469:688–695.
- Highsmith JM, Dhall SS, Haid RW Jr, Rodts GE Jr, Mummaneni PV: Treatment of cervical stenotic myelopathy: a cost and outcome comparison of laminoplasty versus laminectomy and lateral mass fusion. *J Neurosurg Spine* 2011, 14:619–625.
- Manzano GR, Casella G, Wang MY, Vanni S, Levi AD: A prospective, randomized trial comparing expansile cervical laminoplasty and cervical laminectomy and fusion for multilevel cervical myelopathy. *Neurosurgery* 2012, 70:264–277.
- Du W, Wang L, Shen Y, Zhang Y, Ding W, Ren L: Long-term impacts of different posterior operations on curvature, neurological recovery and axial symptoms for multilevel cervical degenerative myelopathy. *Eur Spine J* 2013, 22:1594–1602.
- Yang L, Gu Y, Shi J, Gao R, Liu Y, Li J, Yuan W: Modified plate-only open-door laminoplasty versus laminectomy and fusion for the treatment of cervical stenotic myelopathy. *Orthopedics* 2013, 36:e79–e87.
- Lubelski D, Alvin MD, Nesterenko S, Sundar SJ, Thompson NR, Benzel EC, Mroz TE: Correlation of quality of life and functional outcome measures for cervical spondylotic myelopathy. *Journal of Neurosurgery: Spine* 2016, 24:483–489.